

## PATENT ABSTRACTS OF JAPAN

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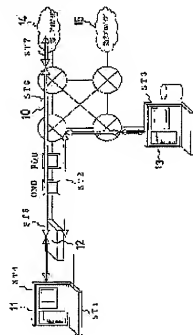
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## (54) METHOD AND DEVICE FOR PROVIDER SWITCHABLE COMMUNICATION

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a method and a device for provider switchable communication with which a provider can be easily and dynamically switched to the other provider.

**SOLUTION:** When performing communications between a first provider 14 or second provider 15 and a user terminal 11 through a *giga-bit* Ethernet (R) 10 which is a backbone network composed of a virtual local area network, a VLAN tag containing information corresponding to the IP address of the provider is applied to information transmitted from the user terminal 11 to the first provider 14 or second provider 15 by terminal equipment 12 constituting a device for connecting the user terminal 11 to the *giga-bit* Ethernet (R) 10 and while using the VLAN tag, the relevant transmitted information is distributed through the backbone network.



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**CLAIMS**

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[Claim(s)]

[Claim 1]In a case where it communicates between a provider and a user terminal via a backbone network which comprised a virtual local area network, With a terminal unit equipped for connecting said user terminal to said backbone network. To transmit information transmitted towards the provider concerned from the user terminal concerned. A provider switchable correspondence procedure characterized by what a VLAN tag including information corresponding to an IP address of the provider concerned is given, and the transmit information concerned is delivered for via said backbone network using the VLAN tag concerned.

[Claim 2]Said terminal unit is receiving information which shows change of the provider concerned from the user terminal concerned, when said user terminal's changes a provider who considers it as a connection object, The provider switchable correspondence procedure according to claim 1 characterized by what is changed into a VLAN tag including information corresponding to an IP address of a provider after the change concerned for said VLAN tag given to said transmit information.

[Claim 3]The provider switchable correspondence procedure according to claim 1 or 2 characterized by what said terminal unit restricts a provider who can connect said user terminal for by operation based on information transmitted by management host who makes operation system of said backbone network.

[Claim 4]The provider switchable correspondence procedure according to claim 1, 2, or 3 characterized by what said terminal unit performs for filtering processing which eliminates either communication between said user terminals, and unlawful access using a MAC Address about a sending signal transmitted from said user terminal.

[Claim 5]The provider switchable correspondence procedure according to claim 1, 2, 3, or 4 characterized by what is done for the remote management of said terminal unit via the backbone network concerned by management host who makes operation system of said backbone network.

[Claim 6]When an attribute about communication of a provider who becomes a connection object of said user terminal is changed, said management host, An attribute about communication of a provider after the change concerned is acquired via the backbone network concerned, Based on an attribute about communication of a provider after the change concerned, so that the contents of said VLAN tag, the contents of the provider who can connect said user terminal, or the contents of filtering processing using said MAC Address may be changed, The provider switchable correspondence procedure according to claim 3, 4, or 5 characterized by what an attribute about communication of a provider after the change concerned is transmitted for to said terminal unit via the backbone network concerned.

[Claim 7]VLAN tag grant processing in which an IP address of the user terminal concerned which said terminal unit gives a VLAN tag and is contained in the transmit information concerned characterized by comprising the following is changed into an IP address assigned by the provider concerned, Delivery processing which delivers the transmit information concerned via said backbone network using said VLAN tag given to said transmit information by the VLAN tag grant processing concerned, A provider switchable correspondence procedure characterized by what a VLAN tag which delivers transmit information which removes said VLAN tag from said transmit information delivered by the delivery processing concerned, and by which the VLAN tag concerned was removed to a provider who considers it as said connection object outside carries out, a consistent course carries out processing one by one, and it is carried out for.

A provider selection process which chooses a provider who considers it as a connection object using a WWW browser in a user terminal from two or more providers who a user has made a contract of.

Operation communications processing with which a terminal unit equipped for connecting said user terminal to a backbone network which comprised a virtual local area network communicates [ a management host and if needed ] of making operation system of the backbone network concerned.

Provider information acquisition processing in which said terminal unit acquires information about a provider in whom said user is doing the connection contract from the management host concerned via said backbone network in the case of the operation communications processing concerned.

Information corresponding to a provider's IP address made into transmit information transmitted by communication start processing in which said user terminal starts communication towards a provider who considers it as said connection object, and the communication start processing concerned from said user terminal with said connection object.

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#### **DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention about the provider switchable correspondence procedure used by communication with the user of the provider who undertakes the communication interface enterprise in the Internet etc., and its provider, and its device, When a user is going to connect with two or more providers via the backbone network which makes a virtual local area network (VLAN) especially, It is related with the provider switchable correspondence procedure

which makes it possible to switch to connection with other providers easily from connection with a certain provider by a user's hope, and its device.

[0002]

[Description of the Prior Art]When communicating between a provider and a user conventionally, carrying out a dialup connection using a telephone line, or connecting using a dedicated line has been performed. Here, in order for a user to switch the provider who becomes a connection destination, only the number of providers which changes the telephone line (telephone number) used for a dialup connection, or is made into a connection destination needed to provide a dedicated line.

[0003]On the other hand in the former, without being caught by network physical arrangement, The virtual local area network (Virtual Local Area Network;VLAN) which is a local area network which carried out grouping of the specific terminal group logically, and built it is invented.

[0004]

[Problem(s) to be Solved by the Invention]However, via the backbone network (trunk-line data service network) built using LAN art like a virtual local area network, In order to make it possible to provide communications service between a provider and a user, and to switch a provider to other providers according to a user's request, there is a problem which is described below.

[0005]According to the contract state of each user and a provider, only the provider with whom the user has made a contract of each user is can be communicated, and it is necessary [ 1st ] for the 1st to be able to set up communication environment so that the provider who has not contracted may not be in a communication possible state. Since an IP address is assigned [ 2nd ] to a user by each provider, respectively, it is necessary to change the IP address of the user terminal which is the communication equipment which a user operates at every change of a provider. It is necessary to prevent communications other than the communication which a user performs [ 3rd ] toward a provider, i.e., users' communication. It is necessary 4th to manage change of a provider's communication environment, such as information gathering about communicating states, such as traffic of a communications network, and a user's utilization time, or change of a provider's MAC Address, etc.

[0006]In here, the main purposes that this invention should be solved are as follows. That is, the 1st purpose of this invention uses as an offer plug the provider switchable correspondence procedure which makes it possible to switch to connection with other providers easily and dynamically from connection with a certain provider by a user's hope, and its device.

[0007]The 2nd purpose of this invention uses as an offer plug a provider [ who makes it possible to switch dynamically the provider who considers it as a connection destination ] switchable [ a user ]-under management of operation system of backbone network correspondence procedure, and its device.

[0008]As for the 3rd purpose of this invention, it is possible for a user to switch dynamically the provider who considers it as a connection destination, and it uses as an offer plug the provider switchable correspondence procedure which makes it possible to prevent the communication which users perform, and its device.

[0009]As for the 4th purpose of this invention, it is possible for a user to switch dynamically the provider who considers it as a connection destination, and with the operation system of a backbone network. Let the provider switchable correspondence procedure which makes possible remote management of the communication function according to change of communication

environment, such as change of a provider's MAC Address, and its device be offer plugs.  
[0010]Other purposes of this invention will become naturally clear from a specification, a drawing, and the statement of each claim especially in a claim.

[0011]

[Means for Solving the Problem]In a case where this invention method communicates between a provider and a user terminal via a backbone network which comprised a virtual local area network in solution of an aforementioned problem, A VLAN tag which includes information corresponding to an IP address of the provider concerned in transmit information transmitted towards the provider concerned from the user terminal concerned is given, and it has the feature which devises the composition technique which delivers the transmit information concerned in the backbone network concerned using the VLAN tag concerned.

[0012]this invention device is a device which connects a user terminal to a virtual local area network in solution of an aforementioned problem, It has the feature which provides a constituent means provided with a terminal unit which is a device which gives a VLAN tag which includes information corresponding to an IP address of the provider concerned in transmit information transmitted towards a provider from said user terminal.

[0013]If it states to a concrete detail, when this invention adopts a new characteristic constituent means or a technique ranging from a generic concept to a subordinate concept enumerated next, by solution of the technical problem concerned, it will be accomplished so that the above-mentioned purpose may be attained.

[0014]Namely, in a case where the 1st feature of this invention method communicates between a provider and a user terminal via a backbone network which comprised a virtual local area network, With a terminal unit equipped for connecting said user terminal to said backbone network. To transmit information transmitted towards the provider concerned from the user terminal concerned. A VLAN tag including information corresponding to an IP address of the provider concerned is given, and it is in composition adoption of a provider switchable correspondence procedure which delivers the transmit information concerned via said backbone network using the VLAN tag concerned.

[0015]The 2nd feature of this invention method is that said terminal unit in the 1st feature of an above-mentioned this invention method receives information which shows change of the provider concerned from the user terminal concerned when said user terminal changes a provider who considers it as a connection object, It is in composition adoption of a provider switchable correspondence procedure changed into a VLAN tag including information corresponding to an IP address of a provider after the change concerned for said VLAN tag given to said transmit information.

[0016]Said terminal unit in the 1st or 2nd feature of an above-mentioned this invention method the 3rd feature of this invention method by operation based on information transmitted by management host who makes operation system of said backbone network. It is in composition adoption of a provider switchable correspondence procedure which restricts a provider who can connect said user terminal.

[0017]In the 1st, 2nd, or 3rd feature of an above-mentioned this invention method the 4th feature of this invention method, Said terminal unit is in composition adoption of a provider switchable correspondence procedure which performs filtering processing which eliminates either communication between said user terminals, and unlawful access using a MAC Address about a sending signal transmitted from said user terminal.

[0018]Said terminal unit in the 1st, 2nd, 3rd, or 4th feature of an above-mentioned this invention

method the 5th feature of this invention method by a management host who makes operation system of said backbone network. It is in composition adoption of a provider switchable correspondence procedure which comes to carry out remote management via the backbone network concerned.

[0019]In the 3rd, 4th, or 5th feature of an above-mentioned this invention method the 6th feature of this invention method, When an attribute about communication of a provider from whom said management host becomes a connection object of said user terminal is changed, An attribute about communication of a provider after the change concerned is acquired via the backbone network concerned, Based on an attribute about communication of a provider after the change concerned, so that the contents of said VLAN tag, the contents of the provider who can connect said user terminal, or the contents of filtering processing using said MAC Address may be changed, It is in composition adoption of a provider switchable correspondence procedure which transmits an attribute about communication of a provider after the change concerned to said terminal unit via the backbone network concerned.

[0020]A provider selection process which chooses a provider who considers it as a connection object using a WWW browser in a user terminal from two or more providers with whom a user has made a contract of the 7th feature of this invention method, A terminal unit equipped for connecting said user terminal to a backbone network which comprised a virtual local area network, Operation communications processing which communicates [ a management host and if needed ] of making operation system of the backbone network concerned, Provider information acquisition processing in which said terminal unit acquires information about a provider in whom said user is doing the connection contract from the management host concerned via said backbone network in the case of the operation communications processing concerned, Communication start processing which starts communication towards a provider whom said user terminal makes said connection object, To transmit information transmitted by the communication start processing concerned from said user terminal. VLAN tag grant processing in which an IP address of the user terminal concerned which said terminal unit gives a VLAN tag including information corresponding to a provider's IP address made into said connection object, and is contained in the transmit information concerned is changed into an IP address assigned by the provider concerned, Delivery processing which delivers the transmit information concerned via said backbone network using said VLAN tag given to said transmit information by the VLAN tag grant processing concerned, It is in composition adoption of a provider switchable correspondence procedure enforced by a VLAN tag's which delivers transmit information's which removes said VLAN tag's from said transmit information delivered by the delivery processing concerned, and by which the VLAN tag concerned was removed to a provider who considers it as said connection object outside's carrying out, and a consistent course carrying out processing one by one.

[0021]When changing a provider whom said user terminal makes a connection object in the 7th feature of an above-mentioned this invention method, the 8th feature of this invention method, When said user terminal changes a provider who considers it as a connection object, said provider selection process, Have the processing which chooses a provider who considers it as a connection object after change using a WWW browser in a user terminal, and said communication start processing, Without said user terminal changing an IP address of the user terminal concerned, Have the processing for which the user terminal concerned starts communication towards a provider who considers it as a connection object after said change, and said VLAN tag grant processing, To transmit information transmitted by the communication start

processing concerned from said user terminal. Said terminal unit gives a VLAN tag including information corresponding to a provider's IP address made into a connection object after said change, Have the processing changed into an IP address assigned by provider who makes an IP address of the user terminal concerned contained in the transmit information concerned a connection object after the change concerned, and said delivery processing, By the VLAN tag grant processing concerned, have the processing which delivers the transmit information concerned via said backbone network using said VLAN tag given to said transmit information, and said VLAN tag outside carries out, and processing, It is in composition adoption of a provider switchable correspondence procedure which has the processing which delivers transmit information which removes said VLAN tag from said transmit information delivered by the delivery processing concerned, and by which the VLAN tag concerned was removed to a provider who considers it as a connection object after said change.

[0022]Said VLAN tag grant processing in the 7th or 8th feature of an above-mentioned this invention method the 9th feature of this invention method, It is attached to a sending signal transmitted by said communication start processing from said user terminal, Have the processing for which said terminal unit carries out filtering processing using a MAC Address, and the filtering processing concerned, When a MAC Address which the sending signal concerned has is not a provider-oriented MAC Address made into said connection object, it is in composition adoption of a provider switchable correspondence procedure which cancels the sending signal concerned.

[0023]When said provider's MAC Address is changed, said operation communications processing in the 7th, 8th, or 9th feature of an above-mentioned this invention method the 10th feature of this invention method, Processing said management host recognizes the change concerned to be via said backbone network, Processing by which said management host concerned transmits information about the change concerned to said terminal unit via said backbone network, Based on transmitted information about the change concerned, the terminal unit concerned is in composition adoption of a provider switchable correspondence procedure which has the processing which changes a MAC Address recognized about the provider concerned into a MAC Address to which it has been transmitted.

[0024]The 1st feature of this invention device is attached to a user terminal which communicates with a provider via a backbone network which comprised a virtual local area network, Have a terminal unit linked to the backbone network concerned, and the terminal unit concerned, It is in composition adoption of a provider switchable communication apparatus provided with a grant function of a VLAN tag which includes information corresponding to an IP address of the provider concerned in transmit information transmitted towards said provider from said user terminal.

[0025]Said user terminal in the 1st feature of the above-mentioned this invention device the 2nd feature of this invention device, When the user terminal concerned changes a provider who considers it as a connection object, consist a provider who considers it as a connection object after change of what is chosen using a WWW browser, and said terminal unit, When said user terminal chooses a provider who considers it as a connection object after said change using a WWW browser, It is in composition adoption of a provider switchable communication apparatus provided with a grant function of a VLAN tag which includes information corresponding to a provider's IP address made into a connection object after the change concerned in transmit information transmitted from the user terminal concerned.

[0026]In the 1st or 2nd feature of the above-mentioned this invention device, operation system of

said backbone network has the 3rd feature of this invention device, and a management host said terminal unit. Communicate said management host and if needed and said user terminal acquires information about a provider who is doing the connection contract from the management host concerned. It is in composition adoption of a provider switchable communication apparatus provided with a function to restrict a provider whose communication is attained for the user terminal concerned, based on the acquired information concerned.

[0027] Said terminal unit in the 1st, 2nd, or 3rd feature of the above-mentioned this invention device the 4th feature of this invention device. It is in composition adoption of a provider switchable communication apparatus provided with a function to perform filtering processing which cancels said sending signal about either communication between the user terminals concerned, and unlawful access using a MAC Address, about a sending signal transmitted from said user terminal.

[0028] Said management host in the 1st, 2nd, 3rd, or 4th feature of the above-mentioned this invention device the 5th feature of this invention device. Carry out remote management of said terminal unit via said backbone network, and it recognizes that a MAC Address was changed in said provider via said backbone network. Have a function which transmits information containing the changed MAC Address concerned to said terminal unit, and said terminal unit. Based on information transmitted by the management host concerned, the terminal unit concerned is in composition adoption of a provider switchable communication apparatus provided with a function which updates a MAC Address recognized per provider concerned until now to said changed MAC Address.

[0029]

[Embodiment of the Invention] Hereafter, an embodiment of the invention is described per the example of a device, and example of a method, referring to an accompanying drawing.

[0030] Via the backbone network by which this invention was constituted from a virtual local area network. Because the terminal unit which connects a user terminal to a virtual local area network gives a VLAN tag to the transmit information transmitted towards the provider from said user terminal when communicating between a provider and a user terminal. Although a provider's change made into a connection destination is enabled, in this example of an embodiment, it is not limited to \*\*\*\*\* etc. which explain Gigabit Ethernet (Gigabit Ethernet) as an example of representation chiefly as a backbone network.

[0031] (Example of a device) Drawing 1 is a conceptual mimetic diagram showing the example of a device of this invention. The Gigabit Ethernet which is the backbone network by which ten were constituted from a virtual local area network among the figure, A terminal unit which 11 is a user terminal, and 12 is the principal part of this invention, and is a device for connecting the user terminal 11 to Gigabit Ethernet 10. The management host in whom 13 makes the operation system of Gigabit Ethernet 10, the 1st provider from whom 14 becomes a connection destination of the user terminal 11, and 15 are the 2nd provider who becomes a connection destination of the user terminal 11.

[0032] Gigabit Ethernet 10 is a fiber-optic network with the access speed of 1 [Gbit/S], and is making LAN of the bus network which performs data communications between predetermined terminals. Gigabit Ethernet 10 is constituted as a virtual local area network (Virtual Local Area Network; VLAN) which carried out grouping of the specific terminal group logically, and built it. The backbone network (trunk-line data service network) is made.

[0033] The user terminal 11 communicates with the 1st provider or the 2nd provider via Gigabit Ethernet 10. For example, let a personal computer, a word processor, a portable telephone, PHS,



a host computer, etc. be the user terminals 11. The user terminal 11 is in the usable state about the WWW browser (World Wide Web browser) which is Internet browser software.

[0034]The terminal unit 12 connects the user terminal 11 to Gigabit Ethernet 10, and mediates communication with the user terminal 11, the 1st provider 14, or the 2nd provider 15. Here, as the terminal unit 12, a smart Ethernet bridge (Smart Ethernet Bridge;SEB) is used.

[0035]The terminal unit 12 gives the VLAN tag which includes the information corresponding to the IP address of the provider concerned in the transmit information transmitted towards the 1st provider 14 or the 2nd provider 15 from the user terminal 11. Here, when the provider whom the user terminal 11 makes a connection object is changed using a WWW browser, the terminal unit 12 gives the VLAN tag which includes the information corresponding to the provider's IP address made into the connection object after change in the transmit information transmitted from the user terminal 11.

[0036]The terminal unit 12 carries out filtering processing using a MAC Address about the sending signal transmitted from said user terminal. A MAC (Media Access Control) address is an address used for access to LAN from each node (each user terminal).

[0037]By this filtering processing, it is the sending signal transmitted from the user terminal 11, and the unjust communication of those other than the thing to the 1st provider 14 or the 2nd provider 15, for example, the communication between user terminals, is prevented.

[0038]Remote management of the terminal unit 12 is carried out to the management host 13 via Gigabit Ethernet 10. And when the management host 13 has recognized that the MAC Address of the 1st provider 14 or the 2nd provider 15 was changed, Based on the information transmitted by the management host 13, the MAC Address which the terminal unit 12 recognized per provider concerned until now is rerecognized to the changed MAC Address. Thereby, in the above-mentioned filtering processing, the communication to the provider by whom the MAC Address was changed from the user terminal 11 is permitted automatically.

[0039]The terminal unit 12 acquires the information about the provider as for whom the user terminal 11 is doing the connection contract from the management host 13 via Gigabit Ethernet 10. And based on the acquired information, the provider whose communication is attained for the user terminal 11 is restricted.

[0040]The terminal unit 12 is connected to Gigabit Ethernet 10 via an optical network terminating set (Optical Network Unit;ONU) and a passive light device (Passive Optical Unit;POU). An optical network terminating set and a passive light device are devices for connecting the user terminal 11 to Gigabit Ethernet 10 which is a fiber-optic network.

[0041]The management host 13 makes the operation system (Operation system;OPS) of Gigabit Ethernet 10 which is the backbone network which comprised a virtual local area network. And Gigabit Ethernet 10 is maintained to a good communicating state, and in order to manage efficiently, the state of Gigabit Ethernet 10 is always supervised.

[0042]When the management host 13 detects change etc. of the MAC Address of the 1st provider 14 or the 2nd provider 15 connected to Gigabit Ethernet 10, The detected information is transmitted to the terminal unit 12 etc., and the increase in efficiency of the communication in Gigabit Ethernet 10 is attained.

[0043]The 1st provider 14 and the 2nd provider 15 undertake the communication interface enterprise in the Internet etc. The 1st provider 14 and the 2nd provider 15 are doing the user and connection contract of its user terminal 11 of its. Therefore, the user terminal 11 performs communication which used the Internet etc. via either the 1st provider 14 or the 2nd provider 15.

[0044](Example of a method) With reference to drawings, it explains per example of a method of

this embodiment applied to said example of a device. Drawing 1 also shows the outline of the example of a method of this invention. The outline of this example of a method is explained using this figure.

[0045] This example of a method explains as an example the case where the user terminal 1 communicates with the 1st provider 14 or the 2nd provider 15. Here, VLAN tag 4 is assigned to the 1st provider 14, and VLAN tag 7 is assigned to the 2nd provider 15.

[0046] First, the user terminal 11 acquires a private IP address automatically with the DHCP server which the terminal unit 12 has because the user terminal 1 connects with the terminal unit 12. Here, a DHCP (Dynamic Host Configuration Protocol) server assigns an IP address dynamically and automatically to each node.

[0047] And a user operates the user terminal 11 and the provider selection process which chooses the provider (for example, the 1st provider 14) who considers it as a connection object from two or more providers who the user has made a contract of is performed using a WWW browser (ST1).

[0048] In the case of a provider selection process (ST1), the terminal unit 12 acquires a global IP address from Gigabit Ethernet 10 with the DHCP server which the management host 13 has. Using this IP address, using IPsec which is encryption communication, the terminal unit 12 and the management host 13 communicate if needed, and perform operation communications processing for user authentication, privacy protection, etc. (ST2). IPsec carries out communication if needed using Internet Protocol.

[0049] Provider information acquisition processing which provides the terminal unit 12 with the information about the provider who the management host 13 identifies the user terminal 11, and is doing the connection contract with the user terminal 11 in the case of operation communications processing (ST2), etc. is performed (ST3). The provider who is doing the connection contract with the user terminal 11 is a provider who becomes connectable with the user terminal 11.

[0050] Then, the user terminal 11 performs communication start processing which starts communication towards the 1st provider 14 (ST4).

[0051] The terminal unit 12 attaches VLAN tag 4 which includes the information corresponding to the 1st provider's 14 IP address in the transmit information (packet) transmitted by communication start processing (ST4) from the user terminal 11. The terminal unit 12 performs VLAN tag grant processing automatically changed into the IP address assigned by the 1st provider 14 with the NAT function which the terminal unit 12 has in the IP address of the user terminal 11 contained in the transmit information transmitted from the user terminal 11 (ST5).

[0052] In this VLAN tag grant processing (ST5), the terminal unit 12 also performs filtering processing which passes only a thing with the MAC Address turned 1st provider 14 among the transmit information transmitted from the user terminal 11.

[0053] Then, delivery processing which delivers the Gigabit Ethernet 10 top for the transmit information to which VLAN tag 4 was given by VLAN tag grant processing (ST5) with the VLAN tag 4 is performed (ST6).

[0054] Then, VLAN tag 4 is removed from the transmit information delivered by delivery processing (ST6), and it processes by the VLAN tag which delivers the transmit information to the 1st provider 14 outside carrying out (ST7).

[0055] By processing of these ST1 to ST6, the user terminal 11 performs transmission using the 1st provider 14. Communication towards the user terminal 11 as well as processing of ST1 to ST6 is performed from the 1st provider 14.

[0056]Drawing 2 is a conceptual mimetic diagram showing the provider change method in this example of a method. A user explains using this figure per [ which switches the provider who considers it as a connection object to the 2nd provider 15 from the 1st provider 14 ] method.

[0057]First, a user operates the user terminal 11 and changes into the 2nd provider 15 the provider who considers it as a connection object from the 1st provider 14 using a WWW browser (ST21). This may be performed in the above-mentioned provider selection process (ST1).

[0058]Then, the user terminal 11 starts communication towards the 2nd provider 15, without changing an own IP address (ST22). This corresponds to the above-mentioned communication start processing (ST4).

[0059]The terminal unit 12 attaches VLAN tag 7 which includes the information corresponding to the 2nd provider's 15 IP address in the transmit information (packet) transmitted from the user terminal 11 by ST21. The terminal unit 12 is automatically changed into the IP address assigned by the 2nd provider 15 with the NAT function which the terminal unit 12 has in the IP address of the user terminal 11 contained in the transmit information transmitted from the user terminal 11 (ST23). This corresponds to the above-mentioned VLAN tag grant processing (ST5).

[0060]In this ST23, the terminal unit 12 also performs filtering processing which passes only a thing with the MAC Address turned 2nd provider 15 among the transmit information transmitted from the user terminal 11.

[0061]Then, the Gigabit Ethernet 10 top is delivered for the transmit information to which VLAN tag 7 was given by ST23 with the VLAN tag 7 (ST24). This corresponds to the above-mentioned delivery processing (ST6).

[0062]Then, VLAN tag 7 is removed from the transmit information delivered by ST24, and the transmit information is delivered to the 2nd provider 15 (ST25). The above-mentioned VLAN tag outside carries out this, and it corresponds to processing (ST7).

[0063]The connection object of the user terminal 11 is switched to the 2nd provider 15 from the 1st provider 14 by processing of these ST21 to ST25, and the user terminal 11 performs transmission using the 1st provider 14. Communication towards the user terminal 11 as well as processing of ST21 to ST25 is performed from the 2nd provider 15.

[0064]The user terminal 11 becomes possible [ switching to connection with other providers easily and dynamically from connection with a certain provider by a user's hope ] with the terminal unit 12, and these enable it to lighten a user's labor.

[0065]Drawing 3 is a conceptual mimetic diagram showing the prevention method of the inter-user communication in this example of a method. It explains per [ which prevents the inter-user communication which is carrying out direct communication using this figure, without the user terminal 11 and the user terminal 31 passing a provider ] method.

[0066]For example, the user terminal 11 tries (ST31) to communicate towards the user terminal 31. Then, since the transmit information transmitted from the user terminal 11 does not have the 1st provider 14 or a MAC Address turned 2nd provider 15, the terminal unit 12 cancels the transmit information by filtering processing (ST32). This corresponds to the filtering processing in the above-mentioned VLAN tag grant processing (ST5).

[0067]By these, the terminal unit 12 prevents carrying out direct communication, without the user terminal 11 and the user terminal 31 passing a provider.

[0068]Drawing 4 is a conceptual mimetic diagram showing the remote management method in this example of a method. Using this figure, lessons is taken from how remote management of the terminal unit 12 by the management host 13 is performed, and it explains.

[0069]For example, suppose that the 2nd provider's 15 MAC Address was changed by exchange

of a router etc. (ST41). Then, the management host 13 recognizes that the 2nd provider's 15 MAC Address was changed via Gigabit Ethernet 10. And the management host 13 notifies the information about change of the 2nd provider's 15 MAC Address to all the terminal units 12 using the 2nd provider 15 (ST42).

[0070]Here, the terminal unit 12 and the management host 13 communicate if needed using IPsec which is encryption communication for user authentication, privacy protection, etc. (ST43). This corresponds to the above-mentioned operation communications processing (ST2). And the terminal unit 12 updates the 2nd provider's 15 MAC Address based on the information notified by the management host 13 (ST44).

[0071]The terminal unit 12 becomes possible [ updating automatically to the new MAC Address ], and these enable it to lighten a user's labor, when remote management is done by the management host 13 and a provider's MAC Address is changed.

[0072]As mentioned above, although the typical example of a device and the example of a method of this invention were explained, this invention is not limited to the not necessarily above-mentioned matter. in the range which attains the purpose of this invention and does so the effect which carries out the following -- suitably -- change -- it is feasible. For example, in the remote management method, the management host 13 measures and manages a user's traffic information and utilization time, and it is good for these information also as notifying to the terminal unit 12.

[0073]

[Effect of the Invention]In the case where it communicates between a provider and a user terminal via the backbone network which comprised a virtual local area network according to this invention as explained above, A terminal unit gives the VLAN tag which includes the information corresponding to the provider's IP address in the transmit information transmitted towards the provider from the user terminal, Since the transmit information concerned is delivered in the backbone network concerned using the VLAN tag, A terminal unit becomes possible [ communicating with a management host and changing a VLAN tag automatically ], and it becomes possible to switch to connection with other providers easily and dynamically from connection with a certain provider by a user's hope.

[0074]When a terminal unit carries out filtering processing using a MAC Address, it becomes possible to prevent communication between the user terminals which are unjust access.

[0075]When a terminal unit communicates [ the management host and if needed ] of making the operation system of a backbone network, it becomes possible to carry out remote management of the communication function according to change of communication environment, such as change of a provider's MAC Address.

[0076]Therefore, this invention serves as very useful art, when a communication enterprise etc. build a broadband network with virtual local area network art by Gigabit Ethernet etc. and will provide the communications service between a provider and a user from now on.

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[Translation done.]

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## TECHNICAL FIELD

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[Field of the Invention]This invention about the provider switchable correspondence procedure used by communication with the user of the provider who undertakes the communication interface enterprise in the Internet etc., and its provider, and its device, When a user is going to connect with two or more providers via the backbone network which makes a virtual local area network (VLAN) especially, It is related with the provider switchable correspondence procedure which makes it possible to switch to connection with other providers easily from connection with a certain provider by a user's hope, and its device.

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## PRIOR ART

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[Description of the Prior Art]When communicating between a provider and a user conventionally, carrying out a dialup connection using a telephone line, or connecting using a dedicated line has been performed. Here, in order for a user to switch the provider who becomes a connection destination, only the number of providers which changes the telephone line (telephone number) used for a dialup connection, or is made into a connection destination needed to provide a dedicated line.

[0003]On the other hand in the former, without being caught by network physical arrangement, The virtual local area network (Virtual Local Area Network;VLAN) which is a local area network which carried out grouping of the specific terminal group logically, and built it is invented.

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## **EFFECT OF THE INVENTION**

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[Effect of the Invention]In the case where it communicates between a provider and a user terminal in this invention via the backbone network which comprised a virtual local area network as explained above, A terminal unit gives the VLAN tag which includes the information corresponding to the provider's IP address in the transmit information transmitted towards the provider from the user terminal, and the transmit information concerned is delivered in the backbone network concerned using the VLAN tag.

Therefore, a terminal unit becomes possible [ communicating with a management host and changing a VLAN tag automatically ], and it becomes possible to switch to connection with other providers easily and dynamically from connection with a certain provider by a user's hope.

[0074]When a terminal unit carries out filtering processing using a MAC Address, it becomes possible to prevent communication between the user terminals which are unjust access.

[0075]When a terminal unit communicates [ the management host and if needed ] of making the operation system of a backbone network, it becomes possible to carry out remote management of the communication function according to change of communication environment, such as change of a provider's MAC Address.

[0076]Therefore, this invention serves as very useful art, when a communication enterprise etc. build a broadband network with virtual local area network art by Gigabit Ethernet etc. and will provide the communications service between a provider and a user from now on.

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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention]However, via the backbone network (trunk-line data service network) built using LAN art like a virtual local area network, In order to make it possible to provide communications service between a provider and a user, and to switch a provider to other providers according to a user's request, there is a problem which is described below.

[0005]According to the contract state of each user and a provider, only the provider with whom the user has made a contract of each user is can be communicated, and it is necessary [ it ] for the 1st to be able to set up communication environment so that the provider who has not contracted may not be in a communication possible state. Since an IP address is assigned [ 2nd ] to a user by each provider, respectively, it is necessary to change the IP address of the user terminal which is the communication equipment which a user operates at every change of a provider. It is necessary to prevent communications other than the communication which a user performs [ 3rd ] toward a provider, i.e., users' communication. It is necessary 4th to manage change of a provider's communication environment, such as information gathering about communicating states, such as traffic of a communications network, and a user's utilization time, or change of a provider's MAC Address, etc.

[0006]In here, the main purposes that this invention should be solved are as follows. That is, the 1st purpose of this invention uses as an offer plug the provider switchable correspondence procedure which makes it possible to switch to connection with other providers easily and dynamically from connection with a certain provider by a user's hope, and its device.

[0007]The 2nd purpose of this invention uses as an offer plug a provider [ who makes it possible to switch dynamically the provider who considers it as a connection destination ] switchable [ a user ]-under management of operation system of backbone network correspondence procedure, and its device.

[0008]As for the 3rd purpose of this invention, it is possible for a user to switch dynamically the provider who considers it as a connection destination, and it uses as an offer plug the provider switchable correspondence procedure which makes it possible to prevent the communication which users perform, and its device.

[0009]As for the 4th purpose of this invention, it is possible for a user to switch dynamically the provider who considers it as a connection destination, and with the operation system of a backbone network. Let the provider switchable correspondence procedure which makes possible remote management of the communication function according to change of communication environment, such as change of a provider's MAC Address, and its device be offer plugs.

[0010]Other purposes of this invention will become naturally clear from a specification, a drawing, and the statement of each claim especially in a claim.

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## MEANS

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[Means for Solving the Problem]In a case where this invention method communicates between a provider and a user terminal via a backbone network which comprised a virtual local area network in solution of an aforementioned problem, A VLAN tag which includes information corresponding to an IP address of the provider concerned in transmit information transmitted towards the provider concerned from the user terminal concerned is given, and it has the feature which devises the composition technique which delivers the transmit information concerned in the backbone network concerned using the VLAN tag concerned.

[0012]this invention device is a device which connects a user terminal to a virtual local area network in solution of an aforementioned problem, It has the feature which provides a constituent means provided with a terminal unit which is a device which gives a VLAN tag which includes information corresponding to an IP address of the provider concerned in transmit information transmitted towards a provider from said user terminal.

[0013]If it states to a concrete detail, when this invention adopts a new characteristic constituent means or a technique ranging from a generic concept to a subordinate concept enumerated next, by solution of the technical problem concerned, it will be accomplished so that the above-mentioned purpose may be attained.

[0014]Namely, in a case where the 1st feature of this invention method communicates between a provider and a user terminal via a backbone network which comprised a virtual local area network, With a terminal unit equipped for connecting said user terminal to said backbone network. To transmit information transmitted towards the provider concerned from the user terminal concerned. A VLAN tag including information corresponding to an IP address of the provider concerned is given, and it is in composition adoption of a provider switchable correspondence procedure which delivers the transmit information concerned via said backbone network using the VLAN tag concerned.

[0015]The 2nd feature of this invention method is that said terminal unit in the 1st feature of an above-mentioned this invention method receives information which shows change of the provider concerned from the user terminal concerned when said user terminal changes a provider who considers it as a connection object, It is in composition adoption of a provider switchable correspondence procedure changed into a VLAN tag including information corresponding to an IP address of a provider after the change concerned for said VLAN tag given to said transmit information.

[0016]Said terminal unit in the 1st or 2nd feature of an above-mentioned this invention method the 3rd feature of this invention method by operation based on information transmitted by management host who makes operation system of said backbone network. It is in composition adoption of a provider switchable correspondence procedure which restricts a provider who can connect said user terminal.

[0017]In the 1st, 2nd, or 3rd feature of an above-mentioned this invention method the 4th feature of this invention method, Said terminal unit is in composition adoption of a provider switchable



correspondence procedure which performs filtering processing which eliminates either communication between said user terminals, and unlawful access using a MAC Address about a sending signal transmitted from said user terminal.

[0018] Said terminal unit in the 1st, 2nd, 3rd, or 4th feature of an above-mentioned this invention method the 5th feature of this invention method by a management host who makes operation system of said backbone network. It is in composition adoption of a provider switchable correspondence procedure which comes to carry out remote management via the backbone network concerned.

[0019] In the 3rd, 4th, or 5th feature of an above-mentioned this invention method the 6th feature of this invention method, When an attribute about communication of a provider from whom said management host becomes a connection object of said user terminal is changed, An attribute about communication of a provider after the change concerned is acquired via the backbone network concerned, Based on an attribute about communication of a provider after the change concerned, so that the contents of said VLAN tag, the contents of the provider who can connect said user terminal, or the contents of filtering processing using said MAC Address may be changed, It is in composition adoption of a provider switchable correspondence procedure which transmits an attribute about communication of a provider after the change concerned to said terminal unit via the backbone network concerned.

[0020] A provider selection process which chooses a provider who considers it as a connection object using a WWW browser in a user terminal from two or more providers with whom a user has made a contract of the 7th feature of this invention method, A terminal unit equipped for connecting said user terminal to a backbone network which comprised a virtual local area network, Operation communications processing which communicates [ a management host and if needed ] of making operation system of the backbone network concerned, Provider information acquisition processing in which said terminal unit acquires information about a provider in whom said user is doing the connection contract from the management host concerned via said backbone network in the case of the operation communications processing concerned, Communication start processing which starts communication towards a provider whom said user terminal makes said connection object, To transmit information transmitted by the communication start processing concerned from said user terminal. VLAN tag grant processing in which an IP address of the user terminal concerned which said terminal unit gives a VLAN tag including information corresponding to a provider's IP address made into said connection object, and is contained in the transmit information concerned is changed into an IP address assigned by the provider concerned, Delivery processing which delivers the transmit information concerned via said backbone network using said VLAN tag given to said transmit information by the VLAN tag grant processing concerned, It is in composition adoption of a provider switchable correspondence procedure enforced by a VLAN tag's which delivers transmit information's which removes said VLAN tag's from said transmit information delivered by the delivery processing concerned, and by which the VLAN tag concerned was removed to a provider who considers it as said connection object outside's carrying out, and a consistent course carrying out processing one by one.

[0021] When changing a provider whom said user terminal makes a connection object in the 7th feature of an above-mentioned this invention method, the 8th feature of this invention method, When said user terminal changes a provider who considers it as a connection object, said provider selection process, Have the processing which chooses a provider who considers it as a connection object after change using a WWW browser in a user terminal, and said

communication start processing, Without said user terminal changing an IP address of the user terminal concerned, Have the processing for which the user terminal concerned starts communication towards a provider who considers it as a connection object after said change, and said VLAN tag grant processing, To transmit information transmitted by the communication start processing concerned from said user terminal. Said terminal unit gives a VLAN tag including information corresponding to a provider's IP address made into a connection object after said change, Have the processing changed into an IP address assigned by provider who makes an IP address of the user terminal concerned contained in the transmit information concerned a connection object after the change concerned, and said delivery processing, By the VLAN tag grant processing concerned, have the processing which delivers the transmit information concerned via said backbone network using said VLAN tag given to said transmit information, and said VLAN tag outside carries out, and processing, It is in composition adoption of a provider switchable correspondence procedure which has the processing which delivers transmit information which removes said VLAN tag from said transmit information delivered by the delivery processing concerned, and by which the VLAN tag concerned was removed to a provider who considers it as a connection object after said change.

[0022]Said VLAN tag grant processing in the 7th or 8th feature of an above-mentioned this invention method the 9th feature of this invention method, It is attached to a sending signal transmitted by said communication start processing from said user terminal, Have the processing for which said terminal unit carries out filtering processing using a MAC Address, and the filtering processing concerned, When a MAC Address which the sending signal concerned has is not a provider-oriented MAC Address made into said connection object, it is in composition adoption of a provider switchable correspondence procedure which cancels the sending signal concerned.

[0023]When said provider's MAC Address is changed, said operation communications processing in the 7th, 8th, or 9th feature of an above-mentioned this invention method the 10th feature of this invention method, Processing said management host recognizes the change concerned to be via said backbone network, Processing by which said management host concerned transmits information about the change concerned to said terminal unit via said backbone network, Based on transmitted information about the change concerned, the terminal unit concerned is in composition adoption of a provider switchable correspondence procedure which has the processing which changes a MAC Address recognized about the provider concerned into a MAC Address to which it has been transmitted.

[0024]The 1st feature of this invention device is attached to a user terminal which communicates with a provider via a backbone network which comprised a virtual local area network, Have a terminal unit linked to the backbone network concerned, and the terminal unit concerned, It is in composition adoption of a provider switchable communication apparatus provided with a grant function of a VLAN tag which includes information corresponding to an IP address of the provider concerned in transmit information transmitted towards said provider from said user terminal.

[0025]Said user terminal in the 1st feature of the above-mentioned this invention device the 2nd feature of this invention device, When the user terminal concerned changes a provider who considers it as a connection object, consist a provider who considers it as a connection object after change of what is chosen using a WWW browser, and said terminal unit, When said user terminal chooses a provider who considers it as a connection object after said change using a WWW browser, It is in composition adoption of a provider switchable communication apparatus

provided with a grant function of a VLAN tag which includes information corresponding to a provider's IP address made into a connection object after the change concerned in transmit information transmitted from the user terminal concerned.

[0026]In the 1st or 2nd feature of the above-mentioned this invention device, operation system of said backbone network has the 3rd feature of this invention device, and a management host said terminal unit, Communicate said management host and if needed and said user terminal acquires information about a provider who is doing the connection contract from the management host concerned, It is in composition adoption of a provider switchable communication apparatus provided with a function to restrict a provider whose communication is attained for the user terminal concerned, based on the acquired information concerned.

[0027]Said terminal unit in the 1st, 2nd, or 3rd feature of the above-mentioned this invention device the 4th feature of this invention device, It is in composition adoption of a provider switchable communication apparatus provided with a function to perform filtering processing which cancels said sending signal about either communication between the user terminals concerned, and unlawful access using a MAC Address, about a sending signal transmitted from said user terminal.

[0028]Said management host in the 1st, 2nd, 3rd, or 4th feature of the above-mentioned this invention device the 5th feature of this invention device, Carry out remote management of said terminal unit via said backbone network, and it recognizes that a MAC Address was changed in said provider via said backbone network, Have a function which transmits information containing the changed MAC Address concerned to said terminal unit, and said terminal unit, Based on information transmitted by the management host concerned, the terminal unit concerned is in composition adoption of a provider switchable communication apparatus provided with a function which updates a MAC Address recognized per provider concerned until now to said changed MAC Address.

[0029]

[Embodiment of the Invention]Hereafter, an embodiment of the invention is described per the example of a device, and example of a method, referring to an accompanying drawing.

[0030]Via the backbone network by which this invention was constituted from a virtual local area network, Because the terminal unit which connects a user terminal to a virtual local area network gives a VLAN tag to the transmit information transmitted towards the provider from said user terminal when communicating between a provider and a user terminal. Although a provider's change made into a connection destination is enabled, in this example of an embodiment, it is not limited to \*\*\*\*\* etc. which explain Gigabit Ethernet (Gigabit Ethernet) as an example of representation chiefly as a backbone network.

[0031](Example of a device) Drawing 1 is a conceptual mimetic diagram showing the example of a device of this invention. The Gigabit Ethernet which is the backbone network by which ten were constituted from a virtual local area network among the figure, A terminal unit which 11 is a user terminal, and 12 is the principal part of this invention, and is a device for connecting the user terminal 11 to Gigabit Ethernet 10, The management host in whom 13 makes the operation system of Gigabit Ethernet 10, the 1st provider from whom 14 becomes a connection destination of the user terminal 11, and 15 are the 2nd provider who becomes a connection destination of the user terminal 11.

[0032]Gigabit Ethernet 10 is a fiber-optic network with the access speed of 1 [Gbit/S], and is making LAN of the bus network which performs data communications between predetermined terminals. Gigabit Ethernet 10 is constituted as a virtual local area network (Virtual Local Area

Network;VLAN) which carried out grouping of the specific terminal group logically, and built it, The backbone network (trunk-line data service network) is made.

[0033]The user terminal 11 communicates with the 1st provider or the 2nd provider via Gigabit Ethernet 10. For example, let a personal computer, a word processor, a portable telephone, PHS, a host computer, etc. be the user terminals 11. The user terminal 11 is in the usable state about the WWW browser (World Wide Web browser) which is Internet browser software.

[0034]The terminal unit 12 connects the user terminal 11 to Gigabit Ethernet 10, and mediates communication with the user terminal 11, the 1st provider 14, or the 2nd provider 15. Here, as the terminal unit 12, a smart Ethernet bridge (Smart Ethernet Bridge;SEB) is used.

[0035]The terminal unit 12 gives the VLAN tag which includes the information corresponding to the IP address of the provider concerned in the transmit information transmitted towards the 1st provider 14 or the 2nd provider 15 from the user terminal 11. Here, when the provider whom the user terminal 11 makes a connection object is changed using a WWW browser, the terminal unit 12 gives the VLAN tag which includes the information corresponding to the provider's IP address made into the connection object after change in the transmit information transmitted from the user terminal 11.

[0036]The terminal unit 12 carries out filtering processing using a MAC Address about the sending signal transmitted from said user terminal. A MAC (Media Access Control) address is an address used for access to LAN from each node (each user terminal).

[0037]By this filtering processing, it is the sending signal transmitted from the user terminal 11, and the unjust communication of those other than the thing to the 1st provider 14 or the 2nd provider 15, for example, the communication between user terminals, is prevented.

[0038]Remote management of the terminal unit 12 is carried out to the management host 13 via Gigabit Ethernet 10. And when the management host 13 has recognized that the MAC Address of the 1st provider 14 or the 2nd provider 15 was changed, Based on the information transmitted by the management host 13, the MAC Address which the terminal unit 12 recognized per provider concerned until now is rerecognized to the changed MAC Address. Thereby, in the above-mentioned filtering processing, the communication to the provider by whom the MAC Address was changed from the user terminal 11 is permitted automatically.

[0039]The terminal unit 12 acquires the information about the provider as for whom the user terminal 11 is doing the connection contract from the management host 13 via Gigabit Ethernet 10. And based on the acquired information, the provider whose communication is attained for the user terminal 11 is restricted.

[0040]The terminal unit 12 is connected to Gigabit Ethernet 10 via an optical network terminating set (Optical Network Unit;ONU) and a passive light device (Passive Optical Unit;POU). An optical network terminating set and a passive light device are devices for connecting the user terminal 11 to Gigabit Ethernet 10 which is a fiber-optic network.

[0041]The management host 13 makes the operation system (Operation system;OPS) of Gigabit Ethernet 10 which is the backbone network which comprised a virtual local area network. And Gigabit Ethernet 10 is maintained to a good communicating state, and in order to manage efficiently, the state of Gigabit Ethernet 10 is always supervised.

[0042]When the management host 13 detects change etc. of the MAC Address of the 1st provider 14 or the 2nd provider 15 connected to Gigabit Ethernet 10, The detected information is transmitted to the terminal unit 12 etc., and the increase in efficiency of the communication in Gigabit Ethernet 10 is attained.

[0043]The 1st provider 14 and the 2nd provider 15 undertake the communication interface

enterprise in the Internet etc. The 1st provider 14 and the 2nd provider 15 are doing the user and connection contract of its user terminal 11 of its. Therefore, the user terminal 11 performs communication which used the Internet etc. via either the 1st provider 14 or the 2nd provider 15. [0044](Example of a method) With reference to drawings, it explains per example of a method of this embodiment applied to said example of a device. Drawing 1 also shows the outline of the example of a method of this invention. The outline of this example of a method is explained using this figure.

[0045]This example of a method explains as an example the case where the user terminal 1 communicates with the 1st provider 14 or the 2nd provider 15. Here, VLAN tag 4 is assigned to the 1st provider 14, and VLAN tag 7 is assigned to the 2nd provider 15.

[0046]First, the user terminal 11 acquires a private IP address automatically with the DHCP server which the terminal unit 12 has because the user terminal 1 connects with the terminal unit 12. Here, a DHCP (Dynamic Host Configuration Protocol) server assigns an IP address dynamically and automatically to each node.

[0047]And a user operates the user terminal 11 and the provider selection process which chooses the provider (for example, the 1st provider 14) who considers it as a connection object from two or more providers who the user has made a contract of is performed using a WWW browser (ST1).

[0048]In the case of a provider selection process (ST1), the terminal unit 12 acquires a global IP address from Gigabit Ethernet 10 with the DHCP server which the management host 13 has. Using this IP address, using IPsec which is encryption communication, the terminal unit 12 and the management host 13 communicate if needed, and perform operation communications processing for user authentication, privacy protection, etc. (ST2). IPsec carries out communication if needed using Internet Protocol.

[0049]Provider information acquisition processing which provides the terminal unit 12 with the information about the provider who the management host 13 identifies the user terminal 11, and is doing the connection contract with the user terminal 11 in the case of operation communications processing (ST2), etc. is performed (ST3). The provider who is doing the connection contract with the user terminal 11 is a provider who becomes connectable with the user terminal 11.

[0050]Then, the user terminal 11 performs communication start processing which starts communication towards the 1st provider 14 (ST4).

[0051]The terminal unit 12 attaches VLAN tag 4 which includes the information corresponding to the 1st provider's 14 IP address in the transmit information (packet) transmitted by communication start processing (ST4) from the user terminal 11. The terminal unit 12 performs VLAN tag grant processing automatically changed into the IP address assigned by the 1st provider 14 with the NAT function which the terminal unit 12 has in the IP address of the user terminal 11 contained in the transmit information transmitted from the user terminal 11 (ST5).

[0052]In this VLAN tag grant processing (ST5), the terminal unit 12 also performs filtering processing which passes only a thing with the MAC Address turned 1st provider 14 among the transmit information transmitted from the user terminal 11.

[0053]Then, delivery processing which delivers the Gigabit Ethernet 10 top for the transmit information to which VLAN tag 4 was given by VLAN tag grant processing (ST5) with the VLAN tag 4 is performed (ST6).

[0054]Then, VLAN tag 4 is removed from the transmit information delivered by delivery processing (ST6), and it processes by the VLAN tag which delivers the transmit information to

the 1st provider 14 outside carrying out (ST7).

[0055]By processing of these ST1 to ST6, the user terminal 11 performs transmission using the 1st provider 14. Communication towards the user terminal 11 as well as processing of ST1 to ST6 is performed from the 1st provider 14.

[0056]Drawing 2 is a conceptual mimetic diagram showing the provider change method in this example of a method. A user explains using this figure per [ which switches the provider who considers it as a connection object to the 2nd provider 15 from the 1st provider 14 ] method.

[0057]First, a user operates the user terminal 11 and changes into the 2nd provider 15 the provider who considers it as a connection object from the 1st provider 14 using a WWW browser (ST21). This may be performed in the above-mentioned provider selection process (ST1).

[0058]Then, the user terminal 11 starts communication towards the 2nd provider 15, without changing an own IP address (ST22). This corresponds to the above-mentioned communication start processing (ST4).

[0059]The terminal unit 12 attaches VLAN tag 7 which includes the information corresponding to the 2nd provider's 15 IP address in the transmit information (packet) transmitted from the user terminal 11 by ST21. The terminal unit 12 is automatically changed into the IP address assigned by the 2nd provider 15 with the NAT function which the terminal unit 12 has in the IP address of the user terminal 11 contained in the transmit information transmitted from the user terminal 11 (ST23). This corresponds to the above-mentioned VLAN tag grant processing (ST5).

[0060]In this ST23, the terminal unit 12 also performs filtering processing which passes only a thing with the MAC Address turned 2nd provider 15 among the transmit information transmitted from the user terminal 11.

[0061]Then, the Gigabit Ethernet 10 top is delivered for the transmit information to which VLAN tag 7 was given by ST23 with the VLAN tag 7 (ST24). This corresponds to the above-mentioned delivery processing (ST6).

[0062]Then, VLAN tag 7 is removed from the transmit information delivered by ST24, and the transmit information is delivered to the 2nd provider 15 (ST25). The above-mentioned VLAN tag outside carries out this, and it corresponds to processing (ST7).

[0063]The connection object of the user terminal 11 is switched to the 2nd provider 15 from the 1st provider 14 by processing of these ST21 to ST25, and the user terminal 11 performs transmission using the 1st provider 14. Communication towards the user terminal 11 as well as processing of ST21 to ST25 is performed from the 2nd provider 15.

[0064]The user terminal 11 becomes possible [ switching to connection with other providers easily and dynamically from connection with a certain provider by a user's hope ] with the terminal unit 12, and these enable it to lighten a user's labor.

[0065]Drawing 3 is a conceptual mimetic diagram showing the prevention method of the inter-user communication in this example of a method. It explains per [ which prevents the inter-user communication which is carrying out direct communication using this figure, without the user terminal 11 and the user terminal 31 passing a provider ] method.

[0066]For example, the user terminal 11 tries (ST31) to communicate towards the user terminal 31. Then, since the transmit information transmitted from the user terminal 11 does not have the 1st provider 14 or a MAC Address turned 2nd provider 15, the terminal unit 12 cancels the transmit information by filtering processing (ST32). This corresponds to the filtering processing in the above-mentioned VLAN tag grant processing (ST5).

[0067]By these, the terminal unit 12 prevents carrying out direct communication, without the user terminal 11 and the user terminal 31 passing a provider.

[0068]Drawing 4 is a conceptual mimetic diagram showing the remote management method in this example of a method. Using this figure, lessons is taken from how remote management of the terminal unit 12 by the management host 13 is performed, and it explains.

[0069]For example, suppose that the 2nd provider's 15 MAC Address was changed by exchange of a router etc. (ST41). Then, the management host 13 recognizes that the 2nd provider's 15 MAC Address was changed via Gigabit Ethernet 10. And the management host 13 notifies the information about change of the 2nd provider's 15 MAC Address to all the terminal units 12 using the 2nd provider 15 (ST42).

[0070]Here, the terminal unit 12 and the management host 13 communicate if needed using IPsec which is encryption communication for user authentication, privacy protection, etc. (ST43). This corresponds to the above-mentioned operation communications processing (ST2). And the terminal unit 12 updates the 2nd provider's 15 MAC Address based on the information notified by the management host 13 (ST44).

[0071]The terminal unit 12 becomes possible [ updating automatically to the new MAC Address ], and these enable it to lighten a user's labor, when remote management is done by the management host 13 and a provider's MAC Address is changed.

[0072]As mentioned above, although the typical example of a device and the example of a method of this invention were explained, this invention is not limited to the not necessarily above-mentioned matter. in the range which attains the purpose of this invention and does so the effect which carries out the following -- suitably -- change -- it is feasible. For example, in the remote management method, the management host 13 measures and manages a user's traffic information and utilization time, and it is good for these information also as notifying to the terminal unit 12.

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[Translation done.]

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#### **DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1]It is a conceptual mimetic diagram of the example of a device, and the example of a method which is an embodiment of this invention.

[Drawing 2]It is a conceptual mimetic diagram showing the provider change method same as the above.

[Drawing 3]It is a conceptual mimetic diagram showing the prevention method of inter-user

communication same as the above.

[Drawing 4] It is a conceptual mimetic diagram showing the remote management method same as the above.

[Description of Notations]

10 -- Gigabit Ethernet

11, 31 -- User terminal

12, 32 -- Terminal unit

13 -- Management host

14 -- The 1st provider

15 -- The 2nd provider

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## **DRAWINGS**

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[Drawing 1]

[Drawing 2]



[Drawing 3]

[Drawing 4]

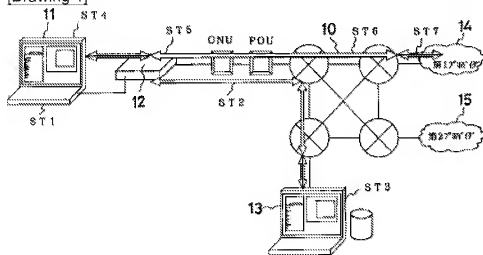
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[Translation done.]

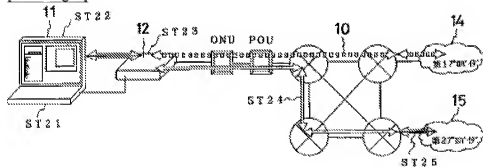
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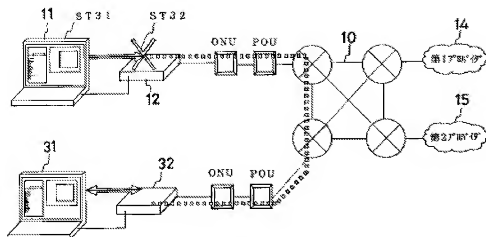
[Drawing 1]



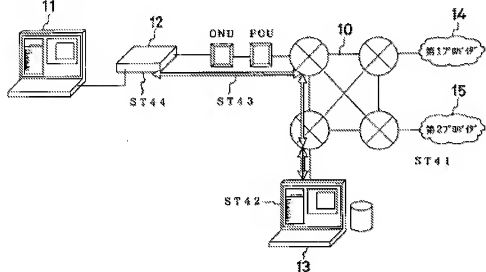
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Translation done.]

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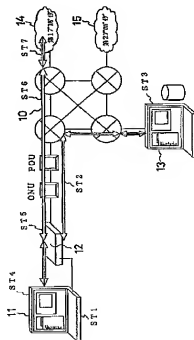
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(54) 【発明の名称】 プロバイダ切換可能通信方法及びその装置

## (57) 【要約】

【課題】 プロバイダを他のプロバイダに、容易に且つ動的に切り換えることを可能とするプロバイダ切換可能通信方法及びその装置の提供。

【解決手段】 仮想ローカルエリア・ネットワークで構成されたバックボーンネットワークであるギガビット・イーサネット（登録商標）10を介して、第1プロバイダ14又は第2プロバイダ15とユーザ端末11との間で通信を行なう場合において、ユーザ端末11をギガビット・イーサネット10に接続するための装置をなす端末装置12によって、当該ユーザ端末11から第1プロバイダ14又は第2プロバイダ15へ向けて送信された送信情報に、当該プロバイダのIPアドレスに対応した情報を含むVLANタグを付与し、当該VLANタグを用いて、当該送信情報を前記バックボーンネットワークを介して配送するものからなる特徴的構成手法の採用。



## 【特許請求の範囲】

【請求項1】 仮想ローカルエリア・ネットワークで構成されたバックボーンネットワークを介して、プロバイダとユーザ端末との間で通信を行なう場合において、前記ユーザ端末を前記バックボーンネットワークに接続するための装置をなす端末装置によって、当該ユーザ端末から当該プロバイダへ向けて送信された送信情報に、当該プロバイダのIPアドレスに対応した情報を含むVLANタグを付与し、当該VLANタグを用いて、当該送信情報を前記バックボーンネットワークを介して配送する、ことを特徴とするプロバイダ切替可能通信方法。

【請求項2】 前記端末装置は、前記ユーザ端末が接続対象とするプロバイダを変更するに当り、当該ユーザ端末から当該プロバイダの変更を示す情報を受信すること、前記送信情報に付与する前記VLANタグを、当該変更後のプロバイダのIPアドレスに対応した情報を含むVLANタグに変更する、ことを特徴とする請求項1に記載のプロバイダ切替可能通信方法。

【請求項3】 前記端末装置は、前記バックボーンネットワークのオペレーションシステムをなす管理ホストから送信された情報に基づく動作によって、前記ユーザ端末が接続可能なプロバイダを制限する、ことを特徴とする請求項1又は2に記載のプロバイダ切替可能通信方法。

【請求項4】 前記端末装置は、前記ユーザ端末から送信された送信番号につき、MACアドレスを用いて前記ユーザ端末同士の通信及び不正アクセスのいずれかを排除するフィルタリング処理を実行する、ことを特徴とする請求項1、2又は3に記載のプロバイダ切替可能通信方法。

【請求項5】 前記端末装置は、前記バックボーンネットワークのオペレーションシステムをなす管理ホストによって、当該バックボーンネットワークを介して、遠隔管理される、ことを特徴とする請求項1、2、3又は4に記載のプロバイダ切替可能通信方法。

【請求項6】 前記管理ホストは、前記ユーザ端末の接続対象となるプロバイダの通信に関する属性が変更されたときは、当該変更後のプロバイダの通信に関する属性を当該バックボーンネットワークを介して取得し、当該変更後のプロバイダの通信に関する属性に基づいて、前記VLANタグの内容、前記ユーザ端末が接続可能なプロバイダの内容、前記MACアドレスを用いたフ

ィルタリング処理の内容のいずれかを変更するよう、前記端末装置に、当該変更後のプロバイダの通信に関する属性を、当該バックボーンネットワークを介して送信する、

ことを特徴とする請求項3、4又は5に記載のプロバイダ切替可能通信方法。

【請求項7】 ユーザが契約している複数のプロバイダの中から接続対象とするプロバイダを、ユーザ端末においてWWWブラウザを用いて選択するプロバイダ選択処理と、

仮想ローカルエリア・ネットワークで構成されたバックボーンネットワークに前記ユーザ端末を接続するための装置をなす端末装置が、当該バックボーンネットワークのオペレーションシステムをなす管理ホストと必要に応じて通信するオペレーション通信処理と、

当該オペレーション通信処理の際に、前記端末装置が、当該管理ホストから、前記ユーザが接続契約しているプロバイダに関する情報を、前記バックボーンネットワークを介して取得するプロバイダ情報取得処理と、

前記ユーザ端末が前記接続対象とするプロバイダに向けて通信を開始する通信開始処理と、当該通信開始処理によって前記ユーザ端末から送信された送信情報に、前記接続対象とするプロバイダのIPアドレスに対応した情報を含むVLANタグを前記端末装置が付与し、当該送信情報に含まれる当該ユーザ端末のIPアドレスを、当該プロバイダから割り振られたIPアドレスに変換するVLANタグ付与処理と、当該VLANタグ付与処理で前記送信情報に付与された前記VLANタグを用いて、当該送信情報を前記バックボーンネットワークを介して配送する配送処理と、当該配送処理で配送された前記送信情報から前記VLANタグを外し、当該VLANタグが外された送信情報を前記接続対象とするプロバイダへ配送するVLANタグ外し処理と、を順次一貫経由して実施する、ことを特徴とするプロバイダ切替可能通信方法。

【請求項8】 前記ユーザ端末が接続対象とするプロバイダを変更するときは、前記プロバイダ選択処理は、

前記ユーザ端末が接続対象とするプロバイダを変更する場合に、変更後の接続対象とするプロバイダを、ユーザ端末においてWWWブラウザを用いて選択する処理を有し、

前記通信開始処理は、前記ユーザ端末が当該ユーザ端末のIPアドレスを変更することなく、当該ユーザ端末が前記変更後の接続対象とするプロバイダに向けて通信を開始する処理を有し、前記VLANタグ付与処理は、

当該通信開始処理によって前記ユーザ端末から送信された送信情報に、前記変更後の接続対象とするプロバイダ

の I P アドレスに対応した情報を含む V L A N タグを前記端末装置が付与し、当該送信情報に含まれる当該ユーザ端末の I P アドレスを、当該変更後の接続対象とするプロバイダから割り振られた I P アドレスに変換する処理を有し、

前記配送処理は、

当該 V L A N タグ付与処理で前記送信情報に付与された前記 V L A N タグを用いて、当該送信情報を前記バックボーンネットワークを介して配送する処理を有し、

前記 V L A N タグ外し処理は、

当該配送処理で配送された前記送信情報から前記 V L A N タグを外し、当該 V L A N タグが外された送信情報を前記変更後の接続対象とするプロバイダへ配送する処理を有する、

ことを特徴とする請求項 7 に記載のプロバイダ切換可能通信方法。

【請求項 9】前記 V L A N タグ付与処理は、

前記通信開始処理によって前記ユーザ端末から送信された送信信号につき、M A C アドレスを用いたフィルタリング処理を前記端末装置が実施する処理を有し、当該フィルタリング処理では、

当該送信信号が持つ M A C アドレスが前記接続対象とするプロバイダ向けの M A C アドレスでないときは、当該送信信号を破棄する、

ことを特徴とする請求項 7 又は 8 に記載のプロバイダ切換可能通信方法。

【請求項 10】前記オペレーション通信処理は、

前記プロバイダの M A C アドレスが変更されたときに、当該変更を前記管理ホストが前記バックボーンネットワークを介して認識する処理と、

当該前記管理ホストが当該変更についての情報を前記端末装置に前記バックボーンネットワークを介して送信する処理と、

送信された当該変更についての情報に基づいて、当該端末装置が当該プロバイダについて認識していた M A C アドレスを、送信されてきた M A C アドレスに変更する処理と、を有する、

ことを特徴とする請求項 7、8 又は 9 に記載のプロバイダ切換可能通信方法。

【請求項 11】仮想ローカルエリア・ネットワークで構成されたバックボーンネットワークを介してプロバイダと通信を行なうユーザ端末につき、当該バックボーンネットワークに接続する端末装置を有し、

当該端末装置は、

前記ユーザ端末から前記プロバイダへ向けて送信された送信情報に、当該プロバイダの I P アドレスに対応した情報を含む V L A N タグの付与機能備える、

ことを特徴とするプロバイダ切換可能通信装置。

【請求項 12】前記ユーザ端末は、

当該ユーザ端末が接続対象とするプロバイダを変更する

場合に、変更後の接続対象とするプロバイダを、WWW ブラウザを用いて選択するものからなり、前記端末装置は、

前記ユーザ端末が前記変更後の接続対象とするプロバイダを、WWW ブラウザを用いて選択したときに、当該ユーザ端末から送信された送信情報に、当該変更後の接続対象とするプロバイダの I P アドレスに対応した情報を含む V L A N タグの付与機能備える、

ことを特徴とする請求項 11 に記載のプロバイダ切換可能通信装置。

【請求項 13】前記バックボーンネットワークのオペレーションシステムは、

管理ホストを有し、

前記端末装置は、

前記管理ホストと必要に応じて通信して、当該管理ホストから、前記ユーザ端末が接続契約しているプロバイダに関する情報を取得し、

当該取得した情報に基づいて、当該ユーザ端末にとって通信可能となるプロバイダを制限する機能備える、

ことを特徴とする請求項 11 又は 12 に記載のプロバイダ切換可能通信装置。

【請求項 14】前記端末装置は、

前記ユーザ端末から送信された送信信号につき、M A C アドレスを用いて当該ユーザ端末同士間の通信及び不正アクセスのいずれかについての前記送信信号を破棄するフィルタリング処理を施す機能備える、

ことを特徴とする請求項 11、12 又は 13 に記載のプロバイダ切換可能通信装置。

【請求項 15】前記管理ホストは、

前記端末装置を前記バックボーンネットワークを介して遠隔管理するものであって、

前記プロバイダにおいて M A C アドレスが変更されたことを、前記バックボーンネットワークを介して認識して、当該変更された M A C アドレスを含む情報を前記端末装置に送信する機能備える、

前記端末装置は、

当該管理ホストから送信された情報に基づいて、当該端末装置が当該プロバイダにつき今まで認識していた M A C アドレスを、前記変更された M A C アドレスに更新する機能備える、

ことを特徴とする請求項 11、12、13 又は 14 に記載のプロバイダ切換可能通信装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、インターネットなどにおける通信接続事業を行なうプロバイダとそのプロバイダのユーザとの通信で用いられるプロバイダ切換可能通信方法及びその装置に関し、特に、仮想ローカルエリア・ネットワーク（V L A N）をなすバックボーンネットワークを介して、ユーザが複数のプロバイダと接続

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しようにするとき、ユーザの希望によりあるプロバイダとの接続から他のプロバイダとの接続に容易に切り換えることを可能とするプロバイダ切換可能通信方法及びその装置に関するものである。

【0002】

【従来の技術】従来、プロバイダとユーザとの間にいて通信をする場合は、電話回線を用いてダイヤルアップ接続するか、又は専用線を用いて接続することが行なわれてきた。ここで、ユーザが接続先となるプロバイダを切り換えるためには、ダイヤルアップ接続に用いる電話番号（電話番号）を変更するか、又は接続先とするプロ

バイダの数だけ専用線を敷けることを必要とした。

【0003】一方、従来においては、ネットワークの物理的な配置にとらわれずに、特定の端末群を論理的にグループ化して構築したローカルエリア・ネットワークである仮想ローカルエリア・ネットワーク（Virtual Local Area Network: V L A N）が考え出されている。

【0004】

【発明が解決しようとする課題】しかしながら、仮想ローカルエリア・ネットワークのような V L A N 技術を用いて構築されたバックボーンネットワーク（基幹ネットワーク）を介して、プロバイダとユーザとの間で通信サービスを提供し、且つユーザの要望に応じてプロバイダを他のプロバイダに切り換えることを可能とするには、以下に述べるような問題がある。

【0005】第1に、各ユーザとプロバイダとの契約状況に応じて、各ユーザはそのユーザが契約しているプロバイダのみ通信可能となり、契約していないプロバイダとは通信可能状態にはならないように、通信環境を設定可能であることが必要となる。第2に、ユーザには各プロバイダからそれぞれ I P アドレスが割り振られるので、ユーザが操作する通信機器であるユーザ端末の I P アドレスを、プロバイダの切り換えのために変更する必要がある。第3に、ユーザがプロバイダに向かって行なう通信以外の通信、すなわちユーザ同士の通信を防止する必要がある。第4に、通信網のトラフィック及びユーザの利用時間などの通信状態に関する情報収集、又はプロバイダの M A C アドレスの変更などプロバイダの通信環境の変更などを管理する必要がある。

【0006】ここにおいて、本発明の解決すべき主要な目的は以下の通りである。即ち、本発明の第1の目的は、ユーザの希望によりあるプロバイダとの接続から他のプロバイダとの接続に、容易に且つ動的に切り換えることを可能とするプロバイダ切換可能通信方法及びその装置を提供せんとするものである。

【0007】本発明の第2の目的は、バックボーンネットワークのオペレーションシステムの管理下で、ユーザが接続先とするプロバイダを動的に切り換えることを可能とするプロバイダ切換可能通信方法及びその装置を提供せんとするものである。

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【0008】本発明の第3の目的は、ユーザが接続先とするプロバイダを動的に切り換えることが可能であり、且つユーザ同士が行なう通信を防止することを可能とするプロバイダ切換可能通信方法及びその装置を提供せんとするものである。

【0009】本発明の第4の目的は、ユーザが接続先とするプロバイダを動的に切り換えることが可能であり、且つ、バックボーンネットワークのオペレーションシステムによって、プロバイダの M A C アドレスの変更など通信環境の変化に応じた通信機能の遠隔管理を可能とするプロバイダ切換可能通信方法及びその装置を提供せんとするものである。

【0010】本発明の他の目的は、明細書、図面、特に、特許請求の範囲における各請求項の記載から自ずと明らかとなろう。

【0011】

【課題を解決するための手段】本発明方法は、上記課題の解決に当たり、仮想ローカルエリア・ネットワークで構成されたバックボーンネットワークを介して、プロバイダとユーザ端末との間で通信を行なう場合において、当該ユーザ端末から当該プロバイダへ向けて送信された送信情報に、当該プロバイダの I P アドレスに対応した情報を含む V L A N タグを付与し、当該 V L A N タグを用いて当該送信情報を当該バックボーンネットワークにおいて配送する構成手法を謂う特徴を有する。

【0012】本発明装置は、上記課題の解決に当たり、ユーザ端末を仮想ローカルエリア・ネットワークに接続する装置であって、前記ユーザ端末からプロバイダへ向けて送信された送信情報に、当該プロバイダの I P アドレスに対応した情報を含む V L A N タグを付与する装置である端末装置を、備えてなる構成手段を謂う特徴を有する。

【0013】更に、具体的詳細に述べると、当該課題の解決では、本発明が次に列举する上位概念から下位概念にわたる新規な特徴的構成手段又は手法を採用することにより、上記目的を達成するように為される。

【0014】即ち、本発明方法の第1の特徴は、仮想ローカルエリア・ネットワークで構成されたバックボーンネットワークを介して、プロバイダとユーザ端末との間で通信を行なう場合において、前記ユーザ端末を前記バックボーンネットワークに接続するための装置をなす端末装置によって、当該ユーザ端末から当該プロバイダへ向けて送信された送信情報に、当該プロバイダの I P アドレスに対応した情報を含む V L A N タグを付与し、当該 V L A N タグを用いて、当該送信情報を前記バックボーンネットワークを介して配送してなるプロバイダ切換可能通信方法の構成採用にある。

【0015】本発明方法の第2の特徴は、上記本発明方法の第1の特徴における前記端末装置が、前記ユーザ端末が接続対象とするプロバイダを変更するに当り、当該

ユーザ端末から当該プロバイダの変更を示す情報を受信することで、前記送信情報に付与する前記VLANタグを、当該変更後のプロバイダのIPアドレスに対応した情報を含むVLANタグに変更してなるプロバイダ切替可能通信方法の構成採用にある。

【0016】本発明方法の第3の特徴は、上記本発明方法の第1又は第2の特徴における前記端末装置が、前記バックボーンネットワークのオペレーションシステムをなす管理ホストから送信された情報に基づく動作によって、前記ユーザ端末が接続可能なプロバイダを制限してなるプロバイダ切替可能通信方法の構成採用にある。

【0017】本発明方法の第4の特徴は、上記本発明方法の第1、第2又は第3の特徴において、前記端末装置が、前記ユーザ端末から送信された送信信号につき、MACアドレスを用いて前記ユーザ端末同士の通信及び不正アクセスのいずれかを排除するフィルタリング処理を実行してなるプロバイダ切替可能通信方法の構成採用にある。

【0018】本発明方法の第5の特徴は、上記本発明方法の第1、第2、第3又は第4の特徴における前記端末装置が、前記バックボーンネットワークのオペレーションシステムをなす管理ホストによって、当該バックボーンネットワークを介して、遠隔管理されてなるプロバイダ切替可能通信方法の構成採用にある。

【0019】本発明方法の第6の特徴は、上記本発明方法の第3、第4又は第5の特徴において、前記管理ホストが、前記ユーザ端末の接続対象となるプロバイダの通信に関する属性が変更されたときは、当該変更後のプロバイダの通信に関する属性を当該バックボーンネットワークを介して取得し、当該変更後のプロバイダの通信に関する属性に基づいて、前記VLANタグの内容、前記ユーザ端末が接続可能なプロバイダの内容、前記MACアドレスを用いたフィルタリング処理の内容のいずれかを変更するよう、前記端末装置に、当該変更後のプロバイダの通信に関する属性を、当該バックボーンネットワークを介して送信してなるプロバイダ切替可能通信方法の構成採用にある。

【0020】本発明方法の第7の特徴は、ユーザが契約している複数のプロバイダの中から接続対象とするプロバイダを、ユーザ端末においてWWWブラウザを用いて選択するプロバイダ選択処理と、仮想ローカルエリア・ネットワークで構成されたバックボーンネットワークに前記ユーザ端末を接続するための装置をなす端末装置が、当該バックボーンネットワークのオペレーションシステムをなす管理ホストと必要に応じて通信するオペレーション通信処理と、当該オペレーション通信処理の際に、前記端末装置が、当該管理ホストから、前記ユーザが接続契約しているプロバイダに関する情報を、前記バックボーンネットワークを介して取得するプロバイダ情報取得処理と、前記ユーザ端末が前記接続対象とするプ

ロバイダに向けて通信を開始する通信開始処理と、当該通信開始処理によって前記ユーザ端末から送信された送信情報に、前記接続対象とするプロバイダのIPアドレスに対応した情報を含むVLANタグを前記端末装置が付与し、当該送信情報に含まれる当該ユーザ端末のIPアドレスを、当該プロバイダから割り振られたIPアドレスに変換するVLANタグ付与処理と、当該VLANタグ付与処理で前記送信情報に付与された前記VLANタグを用いて、当該送信情報を前記バックボーンネットワークを介して配送する配送処理と、当該配送処理で配送された前記送信情報から前記VLANタグを外し、当該VLANタグが外された送信情報を前記接続対象とするプロバイダへ配送するVLANタグ外し処理と、を順次一貫性をもって実施してなるプロバイダ切替可能通信方法の構成採用にある。

【0021】本発明方法の第8の特徴は、上記本発明方法の第7の特徴において、前記ユーザ端末が接続対象とするプロバイダを変更するときは、前記プロバイダ選択処理は、前記ユーザ端末が接続対象とするプロバイダを変更する場合に、変更後の接続対象とするプロバイダを、ユーザ端末においてWWWブラウザを用いて選択する処理を有し、前記通信開始処理は、前記ユーザ端末が当該ユーザ端末のIPアドレスを変更することなく、当該ユーザ端末が前記変更後の接続対象とするプロバイダに向けて通信を開始する処理を有し、前記VLANタグ付与処理は、当該通信開始処理によって前記ユーザ端末から送信された送信情報に、前記変更後の接続対象とするプロバイダのIPアドレスに対応した情報を含むVLANタグを前記端末装置が付与し、当該送信情報に含まれる当該ユーザ端末のIPアドレスを、当該変更後の接続対象とするプロバイダから割り振られたIPアドレスに変換する処理を有し、前記配送処理は、当該VLANタグ付与処理で前記送信情報に付与された前記VLANタグを用いて、当該送信情報を前記バックボーンネットワークを介して配送する処理を有し、前記VLANタグ外し処理は、当該配送処理で配送された前記送信情報から前記VLANタグを外し、当該VLANタグが外された送信情報を前記変更後の接続対象とするプロバイダへ配送する処理を有してなるプロバイダ切替可能通信方法の構成採用にある。

【0022】本発明方法の第9の特徴は、上記本発明方法の第7又は第8の特徴における前記VLANタグ付与処理が、前記通信開始処理によって前記ユーザ端末から送信された送信信号につき、MACアドレスを用いたフィルタリング処理を前記端末装置が実施する処理を有し、当該フィルタリング処理は、当該送信信号が所定MACアドレスが前記接続対象とするプロバイダ向けのMACアドレスではないときは、当該送信信号を放棄してなるプロバイダ切替可能通信方法の構成採用にある。

【0023】本発明方法の第10の特徴は、上記本発明



方法の第7、第8又は第9の特徴における前記オペレーション通信処理が、前記プロバイダのMACアドレスが変更されるときに、当該変更を前記管理ホストが前記バックボーンネットワークを介して認識する処理と、当該前記管理ホストが当該変更についての情報を前記端末装置に前記バックボーンネットワークを介して送信する処理と、送信された当該変更についての情報に基づいて、当該端末装置が当該プロバイダについて認識していたMACアドレスを、送信されてきたMACアドレスに変更する処理と、を有してなるプロバイダ切替可能通信方法の構成採用にある。

【0024】本発明装置の第1の特徴は、仮想ローカルエリア・ネットワークで構成されたバックボーンネットワークを介してプロバイダと通信を行なうユーザ端末につき、当該バックボーンネットワークに接続する端末装置を有し、当該端末装置は、前記ユーザ端末から前記プロバイダへ向けて送信された送信情報を、当該プロバイダのIPアドレスに対応した情報を含むVLANタグの付与機能を備えてなるプロバイダ切替可能通信装置の構成採用にある。

【0025】本発明装置の第2の特徴は、上記本発明装置の第1の特徴における前記ユーザ端末が、当該ユーザ端末が接続対象とするプロバイダを変更する場合に、変更後の接続対象とするプロバイダを、WWWブラウザを用いて選択するものからなり、前記端末装置は、前記ユーザ端末が前記変更後の接続対象とするプロバイダを、WWWブラウザを用いて選択したときに、当該ユーザ端末から送信された送信情報に、当該変更後の接続対象とするプロバイダのIPアドレスに対応した情報を含むVLANタグの付与機能を備えてなるプロバイダ切替可能通信装置の構成採用にある。

【0026】本発明装置の第3の特徴は、上記本発明装置の第1又は第2の特徴において、前記バックボーンネットワークのオペレーションシステムが、管理ホストを有し、前記端末装置は、前記管理ホストと必要に応じて通信して、当該管理ホストから、前記ユーザ端末が接続契約しているプロバイダに関する情報を取得し、当該取得した情報に基づいて、当該ユーザ端末にとって通信可能となるプロバイダを制限する機能を備えてなるプロバイダ切替可能通信装置の構成採用にある。

【0027】本発明装置の第4の特徴は、上記本発明装置の第1、第2又は第3の特徴における前記端末装置が、前記ユーザ端末から送信された送信信号につき、MACアドレスを用いて当該ユーザ端末上側の通信及び不正アクセスのいずれかについての前記送信信号を破壊するフィルタリング処理を施す機能を備えてなるプロバイダ切替可能通信装置の構成採用にある。

【0028】本発明装置の第5の特徴は、上記本発明装置の第1、第2、第3又は第4の特徴における前記管理ホストが、前記端末装置を前記バックボーンネットワ

クを介して遠隔管理するものであって、前記プロバイダにおいてMACアドレスが変更されたことを、前記バックボーンネットワークを介して認識して、当該変更されたMACアドレスを含む情報を前記端末装置に送信する機能を備え、前記端末装置は、当該管理ホストから送信された情報に基づいて、当該端末装置が当該プロバイダにつき今まで認識していたMACアドレスを、前記変更されたMACアドレスに更新する機能を備えてなるプロバイダ切替可能通信装置の構成採用にある。

【0029】

【発明の実施の形態】以下、添付図面を参照しながら、本発明の実施の形態を装置例及び方法例につき説明する。

【0030】なお、本発明は、仮想ローカルエリア・ネットワークで構成されたバックボーンネットワークを介して、プロバイダとユーザ端末との間で通信を行なう場合に、ユーザ端末を仮想ローカルエリア・ネットワークに接続する端末装置が、前記ユーザ端末からプロバイダへ向けて送信された送信情報にVLANタグを付与すること、接続先とするプロバイダの切替を可能とするものであるが、本実施形態例では、バックボーンネットワークとしてもつばらギガビット・イーサネット（Gigabit Ethernet）を代表例として説明するものこれ等に限定されるものではない。

【0031】（装置例）図1は、本発明の装置例を示す概念模式図である。図中、10は仮想ローカルエリア・ネットワークで構成されたバックボーンネットワークであるギガビット・イーサネット、11はユーザ端末、12は本発明の主要部であるユーザ端末11をギガビット・イーサネット10に接続するための装置である端末装置、13はギガビット・イーサネット10のオペレーションシステムをなす管理ホスト、14はユーザ端末11の接続先となる第1プロバイダ、15はユーザ端末11の接続先となる第2プロバイダである。

【0032】ギガビット・イーサネット10は、1[Gbit/s]の伝送速度を持つ光ファイバ網であり、所定の端末間でデータ伝送を行なうバス型ネットワークのLANをなしている。また、ギガビット・イーサネット10は、特定の端末群を論理的にグループ化して構築した仮想ローカルエリア・ネットワーク（Virtual Local Area Network: VLAN）として構成されており、バックボーンネットワーク（基幹ネットワーク）をなしている。

【0033】ユーザ端末11は、ギガビット・イーサネット10を介して第1プロバイダ又は第2プロバイダと通信を行なうものである。例えば、パーソナル・コンピュータ、ワードプロセッサ、携帯電話機、PHS、ホストコンピュータなどをユーザ端末11とする。また、ユーザ端末11は、インターネット閲覧ソフトであるWWWブラウザ（World Wide Web browser）を使用可能な

状態となっている。

【0034】端末装置 12 は、ユーザ端末 11 をギガビット・イーサネット 10 に接続して、ユーザ端末 11 と第 1 プロバイダ 14 又は第 2 プロバイダ 15 との通信を仲介するものである。ここで、端末装置 12 としては、スマート・イーサネット・ブリッジ (Smart Ethernet Bridge: SEB) を用いる。

【0035】また、端末装置 12 は、ユーザ端末 11 から第 1 プロバイダ 14 又は第 2 プロバイダ 15 へ向けて送信された送信情報に、当該プロバイダの IP アドレスに対応した情報を含む VLAN タグを付与する。ここで、ユーザ端末 11 が接続対象とするプロバイダを、WWW ブラウザを用いて変更したときは、端末装置 12 はユーザ端末 11 から送信された送信情報に、変更後の接続対象とするプロバイダの IP アドレスに対応した情報を含む VLAN タグを付与する。

【0036】また、端末装置 12 は、前記ユーザ端末から送信された送信信号につき、MAC アドレスを用いたフィルタリング処理をする。なお、MAC (Media Access Control) アドレスとは、各ノード (各ユーザ端末) から LAN へのアクセスに用いられるアドレスである。

【0037】このフィルタリング処理により、ユーザ端末 11 から送信された送信信号であって第 1 プロバイダ 14 又は第 2 プロバイダ 15 に対するもの以外の不正な通信、例えばユーザ端末同士間の通信を防止する。

【0038】また、端末装置 12 は、ギガビット・イーサネット 10 を介して管理ホスト 13 に遠隔管理される。そして、第 1 プロバイダ 14 又は第 2 プロバイダ 15 の MAC アドレスが変更されたことを管理ホスト 13 が認識したときは、管理ホスト 13 から送信された情報に基づいて、端末装置 12 が当該プロバイダにつき今まで認識していた MAC アドレスを、変更された MAC アドレスに認識しなおす。これにより、前述のフィルタリング処理において、ユーザ端末 11 から MAC アドレスが変更されたプロバイダへの通信が自動的に許可される。

【0039】また、端末装置 12 は、ユーザ端末 11 が接続契約しているプロバイダに関する情報を、管理ホスト 13 からギガビット・イーサネット 10 を介して取得する。そして、その取得した情報に基づいて、ユーザ端末 11 にとって通信可能となるプロバイダを制限する。

【0040】端末装置 12 は、光網終端装置 (Optical Network Unit: ONU) 及び受動光装置 (Passive Optical Unit: POU) を介して、ギガビット・イーサネット 10 に接続される。なお、光網終端装置及び受動光装置は、ユーザ端末 11 を光ファイバ網であるギガビット・イーサネット 10 に接続するための装置である。

【0041】管理ホスト 13 は、仮想ローカルエリア・ネットワークで構成されたバックボーンネットワークであるギガビット・イーサネット 10 のオペレーションシ

ステム (Operation system: OPS) をなすものである。そして、ギガビット・イーサネット 10 を良好な通信状態に維持し、かつ効率的に運営するために、ギガビット・イーサネット 10 の状態を常に監視している。

【0042】また、管理ホスト 13 は、ギガビット・イーサネット 10 に接続される第 1 プロバイダ 14 又は第 2 プロバイダ 15 の MAC アドレスの変更などを検知したときは、その検知した情報を端末装置 12 などに送信して、ギガビット・イーサネット 10 における通信の効率化を図っている。

【0043】第 1 プロバイダ 14 及び第 2 プロバイダ 15 は、インターネットなどにおける通信接続事業を行なうものである。第 1 プロバイダ 14 及び第 2 プロバイダ 15 は、それぞれユーザ端末 11 のユーザと接続契約をしている。したがって、ユーザ端末 11 は、第 1 プロバイダ 14 又は第 2 プロバイダ 15 のいずれかを經由してインターネットなどを利用して通信を行なう。

【0044】(方法例) 前記装置例に適用する本実施形態の方法例につき図面を参照して説明する。図 1 は、本発明の方法例の概要を示している。この図を用いて本方法例の概要について説明する。

【0045】本方法例では、ユーザ端末 11 が第 1 プロバイダ 14 又は第 2 プロバイダ 15 と通信をする場合を例として説明する。ここで、第 1 プロバイダ 14 には VLAN タグ 14 が割り当てられており、第 2 プロバイダ 15 には VLAN タグ 7 が割り当てられている。

【0046】まず、ユーザ端末 11 が端末装置 12 と接続することで、ユーザ端末 11 は端末装置 12 が持つ DHCP サーバによって、プライベートな IP アドレスを自動的に取得する。ここで、DHCP (Dynamic Host Configuration Protocol) サーバとは、各ノードに対して動的に且つ自動的に IP アドレスを割り振るものである。

【0047】そして、ユーザがユーザ端末 11 を操作して、WWW ブラウザを用いて、ユーザが契約している複数のプロバイダの中から接続対象とするプロバイダ (例えば、第 1 プロバイダ 14) を選択するプロバイダ選択処理を行なう (ST1)。

【0048】プロバイダ選択処理 (ST1) の際に、端末装置 12 は、管理ホスト 13 が持つ DHCP サーバによって、ギガビット・イーサネット 10 からグローバルな IP アドレスを取得する。この IP アドレスを用いて端末装置 12 と管理ホスト 13 は、ユーザ認証及びプライバシー保護等のために暗号化通信である IPsec を用いて、必要に応じて通信して、オペレーション通信処理を行なう (ST2)。なお、IPsec とは、インターネット・プロトコルを用いて必要に応じた通信をするものである。

【0049】オペレーション通信処理 (ST2) の際に、管理ホスト 13 は、ユーザ端末 11 を識別し且つユ

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ユーザ端末11と接続契約しているプロバイダに関する情報などを、端末装置12に提供するプロバイダ情報取得処理を行なう（ST3）。なお、ユーザ端末11と接続契約しているプロバイダとは、ユーザ端末11と接続可能となるプロバイダである。

【0050】その後、ユーザ端末11が第1プロバイダ14に向けて通信を開始する通信開始処理を行なう（ST4）。

【0051】端末装置12は、通信開始処理（ST4）によってユーザ端末11から送信された送信情報（パケット）に、第1プロバイダ14のIPアドレスに対応した情報を含むVLANタグ4を付ける。さらに、端末装置12は、ユーザ端末11から送信された送信情報に含まれるユーザ端末11のIPアドレスを、端末装置12が持つNAT機能によって、第1プロバイダ14から割り振られたIPアドレスへ自動的に変換するVLANタグ付与処理を行なう（ST5）。

【0052】このVLANタグ付与処理（ST5）では、端末装置12は、ユーザ端末11から送信されてきた送信情報のうちで第1プロバイダ14向けのMACアドレスを持つもののみを通過させるフィルタリング処理を行なう。

【0053】その後、VLANタグ付与処理（ST5）でVLANタグ4が付与された送信情報を、そのVLANタグ4によって、ギガビット・イーサネット10上を配送する配送処理を行なう（ST6）。

【0054】その後、配送処理（ST6）で配送された送信情報からVLANタグ4を外し、その送信情報を第1プロバイダ14へ配送するVLANタグ外し処理を行なう（ST7）。

【0055】これらのST1からST6の処理により、ユーザ端末11は第1プロバイダ14を利用した送信を実行する。なお、第1プロバイダ14からユーザ端末11へ向けての通信も、ST1からST6の処理と同様にして行なわれる。

【0056】図2は、本方法例におけるプロバイダ切替方法を示す概念模式図である。この図を用いて、ユーザが接続対象とするプロバイダを、第1プロバイダ14から第2プロバイダ15へ切り換える方法につき説明する。

【0057】まず、ユーザがユーザ端末11を操作して、WWWブラウザを用いて、接続対象とするプロバイダを第1プロバイダ14から第2プロバイダ15へ変更する（ST21）。これは前述のプロバイダ選択処理（ST11）において行なってもよい。

【0058】その後、ユーザ端末11は、自身のIPアドレスを変更することなく、第2プロバイダ15に向けて通信を開始する（ST22）。これは前述の通信開始処理（ST4）に対応するものである。

【0059】端末装置12は、ST21でユーザ端末11

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1から送信された送信情報（パケット）に、第2プロバイダ15のIPアドレスに対応した情報を含むVLANタグ7を付ける。さらに、端末装置12は、ユーザ端末11から送信された送信情報に含まれるユーザ端末11のIPアドレスを、端末装置12が持つNAT機能によって、第2プロバイダ15から割り振られたIPアドレスへ自動的に変換する（ST23）。これは前述のVLANタグ付与処理（ST5）に対応するものである。

【0060】このST23では、端末装置12は、ユーザ端末11から送信されてきた送信情報のうちで第2プロバイダ15向けのMACアドレスを持つもののみを通過させるフィルタリング処理を行なう。

【0061】その後、ST23でVLANタグ7が付与された送信情報を、そのVLANタグ7によって、ギガビット・イーサネット10上を配送する（ST24）。これは前述の配送処理（ST6）に対応するものである。

【0062】その後、ST24で配送された送信情報からVLANタグ7を外し、その送信情報を第2プロバイダ15へ配送する（ST25）。これは前述のVLANタグ外し処理（ST7）に対応するものである。

【0063】これらのST21からST25の処理により、ユーザ端末11の接続対象が第1プロバイダ14から第2プロバイダ15へ切り換えられ、ユーザ端末11は第1プロバイダ14を利用した送信を実行する。なお、第2プロバイダ15からユーザ端末11へ向けての通信も、ST21からST25の処理と同様にして行なわれる。

【0064】これらにより、ユーザ端末11は、端末装置12によって、ユーザの希望によりあるプロバイダとの接続から他のプロバイダとの接続に、容易に且つ動的に切り換えることが可能となり、ユーザの労力を軽減することが可能となる。

【0065】図3は、本方法例におけるユーザ間通信の防止方法を示す概念模式図である。この図を用いて、ユーザ端末11とユーザ端末31とがプロバイダを介さずに直接通信することであるユーザ間通信を、防止する方法につき説明する。

【0066】例えば、ユーザ端末11がユーザ端末31に向けて通信を行なおうとする（ST31）。すると、端末装置12は、ユーザ端末11から送信されてきた送信情報が第1プロバイダ14又は第2プロバイダ15向けのMACアドレスを持っていないので、フィルタリング処理によりその送信情報を破棄する（ST32）。これは前述のVLANタグ付与処理（ST5）におけるフィルタリング処理に対応するものである。

【0067】これらにより、端末装置12は、ユーザ端末11とユーザ端末31とがプロバイダを介さずに直接通信することを防止する。

【0068】図4は、本方法例における遠隔管理方法を

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示す概念模式図である。この図を用いて、管理ホスト 13 による端末装置 12 の遠隔管理がどのように行なわれるかにつき説明する。

【0069】例えば、ルータの交換などにより、第 2 プロバイダ 15 の MAC アドレスが変更されたとする (ST41)。すると、管理ホスト 13 は、第 2 プロバイダ 15 の MAC アドレスが変更されたことを、ギガビット・イーサネット 10 を介して認識する。そして、管理ホスト 13 は、第 2 プロバイダ 15 の MAC アドレスの変更についての情報を、第 2 プロバイダ 15 を利用する端

末装置 12 の全てに通知する (ST42)。  
【0070】ここで、端末装置 12 と管理ホスト 13 は、ユーザ認証及びプライバシー保護等のために暗号化通信である Psec を用いて、必要に応じて通信をする (ST43)。これは前述のオペレーション通信処理 (ST2) に対応するものである。そして、端末装置 12 は、管理ホスト 13 から通知された情報に基づいて、第 2 プロバイダ 15 の MAC アドレスを更新する (ST44)。

【0071】これらにより、端末装置 12 は、管理ホスト 13 によって遠隔管理され、プロバイダの MAC アドレスが変更されたときに、その新たな MAC アドレスに自動的に更新することが可能となり、ユーザの労力を軽減することが可能となる。

【0072】以上、本発明の代表的な装置例及び方法例について説明したが、本発明は、必ずしも上記した事項に限定されるものではない。本発明の目的を達し、下記する効果を奏する範囲において、適宜変更実施可能である。例えば、遠隔管理方法では、ユーザのトラフィック情報及び利用時間を管理ホスト 13 が測定及び管理して、これらの情報に端末装置 12 へ通知することとしてもよい。

【0073】

【発明の効果】以上説明したように、本発明によれば、仮想ローカルエリア・ネットワークで構成されたバックボーンネットワークを介して、プロバイダとユーザ端末との間で通信を行なう場合において、ユーザ端末からプロバイダへ向けて送信された送信情報に、そのプロバイ

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ダの IP アドレスに対応した情報を含む VLAN タグを端末装置が付与し、その VLAN タグを用いて当該送信情報を当該バックボーンネットワークにおいて配送するので、端末装置が管理ホストと通信して VLAN タグを自動的に変更することが可能となり、ユーザの希望によりあるプロバイダとの接続から他のプロバイダとの接続に、容易に且つ動的に切り換えることが可能となる。

【0074】また、端末装置が MAC アドレスを用いたフィルタリング処理をすることにより、不正なアクセスであるユーザ端末間の通信を防止することが可能となる。

【0075】また、端末装置がバックボーンネットワークのオペレーションシステムをなす管理ホストと必要に応じて通信することにより、プロバイダの MAC アドレスの変更など通信環境の変化に応じた通信機能の遠隔管理をすることが可能となる。

【0076】したがって、本発明は、今後、通信事業者などがギガビット・イーサネットなどにより広帯域なネットワークを仮想ローカルエリア・ネットワーク技術で構築し、プロバイダとユーザ間の通信サービスを提供する際に、極めて有用な技術となる。

【図面の簡単な説明】

【図 1】本発明の実施形態である装置例及び方法例の概念模式図である。

【図 2】同上におけるプロバイダ切替方法を示す概念模式図である。

【図 3】同上におけるユーザ間通信の防止方法を示す概念模式図である。

【図 4】同上における遠隔管理方法を示す概念模式図である。

【符号の説明】

10…ギガビット・イーサネット

11、31…ユーザ端末

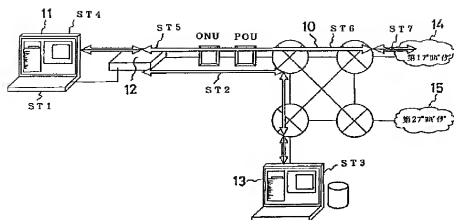
12、32…端末装置

13…管理ホスト

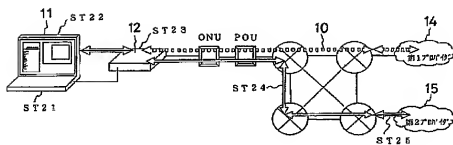
14…第 1 プロバイダ

15…第 2 プロバイダ

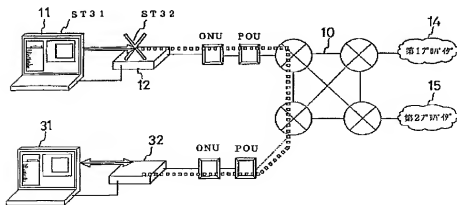
【図1】



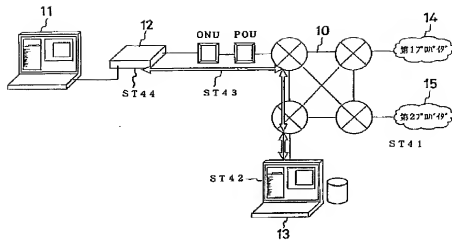
【図2】



【図3】



【図4】



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